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Renewable Diesel's Rising Tide

An update on U.S. renewable diesel projects—operational, expanding, under construction and proposed—giving new purpose to aging oil refineries. The report represents a transformative volume of nearly 5.5 billion gallons of new or potential capacity.

By [Tom Bryan](#) | January 12, 2021

The appeal of stacking the \$1-per-gallon biodiesel tax credit on top of California's Low Carbon Fuel Standard credits, while reducing RIN exposure for those that have it, has encouraged a race for renewable diesel production capacity that will likely transform America's biomass-based-diesel industry over the next few years.

The federal tax credit is guaranteed only through 2022, but that's runway enough for developers to continue transforming half a dozen U.S. oil refineries into renewable diesel plants, even as two existing renewable diesel producers—both in Louisiana—proceed with massive expansions. As 2020 expired, *Biodiesel Magazine* was aware of four operational renewable diesel plants in the United States: the two expanding facilities, capable of producing 90 MMgy and 275



This aging Phillips 66 refinery in Rodeo, California, with access to the San Francisco Bay, is slated to be reconfigured to produce 680 MMgy of renewable diesel, renewable gasoline and sustainable aviation fuel. The project is dubbed Rodeo Renewed.
PHOTO: PHILLIPS 66

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MMgy prior to upsizing; a newly commissioned 184 MMgy plant in North Dakota; and a 4 MMgy unit in Kansas.

That existing 553 MMgy of capacity, while impressive by itself, will soon be eclipsed by six more renewable diesel plants under construction, plus the expansions. Altogether, this first big wave of construction represents over 2 billion gallons of biobased-diesel capacity. And what's poised to come next could be even more extraordinary. At least five additional proposed renewable diesel facilities—each of them massive—represent another 3.3 billion gallons of potential capacity. Altogether, the 14 facilities in this overview represent nearly 5.5 billion gallons of new or potential capacity, which is double the U.S. biodiesel industry's current size.

It will take years to know how much renewable diesel capacity is ultimately built out, and what impact it has on North America's current fleet of 100-plus operational biodiesel plants, but it is increasingly clear that the biobased-diesel industry's two segments—sharing markets, incentives and feedstock—are veering toward unification, politically and logistically.

Bakersfield Renewable Fuels
UNDER CONSTRUCTION / 230 MMgy
Bakersfield, California

Bakersfield Renewable Fuels' parent company, Global Clean Energy Holdings Inc., purchased the Bakersfield refinery in June after raising \$365 million to acquire and retrofit the facility to produce renewable diesel, liquid propane and naphtha. The refinery will use a variety of feedstocks including waste fats, used cooking oil, soybean oil and distillers corn oil—as well as GCEH's proprietary camelina oil.

The overhaul of the refinery is being handled by ARB Inc., a Bakersfield-based EPC contractor. The facility is expected to be commissioned in early 2022, with start-up capacity around 230 MMgy. Haldor Topsoe is supplying the plant with its HydroFlex process technology, a package that includes basic engineering, license, proprietary equipment and a process catalyst.

In August, ExxonMobil signed an agreement with GCEH to purchase 105 MMgy of renewable diesel from the facility, for five years, starting in 2022. ExxonMobil plans to distribute the renewable diesel within California and potentially to other domestic and international markets.

Note: Biodiesel Magazine's 2021 Biodiesel and Renewable Diesel Plant Map listed this facility as Alon Bakersfield Refinery, its name under previous ownership.

CVR Energy Inc. - Wynnewood
UNDER CONSTRUCTION / 100 MMgy
Wynnewood, Oklahoma

In late December, CVR Energy Inc. confirmed that its board of directors had approved a plan to retrofit the company's refinery in Wynnewood, Oklahoma, to produce renewable diesel and naphtha. The project—centered around converting the facility's hydrocracker unit to renewable diesel production—is expected to be complete in mid-2021, allowing the refinery to produce nearly 100 MMgy of renewable fuel.

“Detailed engineering design work for the project is underway,” said Dave Lamp, CEO of CVR Energy. “We also have ordered long lead-time equipment and began construction work. ... We continue to expect the unit to be in service by July 1, 2021.”

A statement released by CVR Energy characterized the current project as the first of three phases of the company's long-term renewable diesel strategy. During a third-quarter earnings call in November, Lamp said phase one is the conversion of the existing hydrocracker at the Wynnewood refinery; phase two would include the installation of a pretreatment unit at the Wynnewood plant that would allow the renewable diesel unit to process lower-carbon feedstocks such as corn oil, animal fats and used cooking oil; and phase three would pursue a similar renewable diesel project at CVR's Coffeyville, Kansas, refinery.

CVR Energy has been candid about the fact that it is pursuing renewable diesel production as a means of reducing its annual renewable identification number (RIN) exposure under the Renewable Fuel Standard.

Note: This project was not represented on Biodiesel Magazine's 2021 Biodiesel and Renewable Diesel Plant Map.

Diamond Green Diesel - Norco
UNDER EXPANSION / 675 MMgy
Norco, Louisiana

Having already expanded its Norco, Louisiana, renewable diesel plant from 160 MMgy to 275 MMgy in 2018, Diamond Green Diesel—a joint venture of Darling Ingredients and a subsidiary of Valero Energy Corp.—is now increasing the unit's capacity to 675 MMgy. The project is currently underway and on track to be completed in 2021.

Joseph Gorder, chairman and CEO of Valero, addressed the company's renewable diesel business during the company's third quarter earnings call in October. He said Valero's renewable diesel business has remained resilient during COVID-19, and confirmed that the expansion of the Norco facility was progressing on schedule.

In early November, Honeywell confirmed that it was installing a second Ecofining process unit at the Norco refinery (the first being installed in 2018). Honeywell's Ecofining technology is currently employed in four commercial-scale facilities, including two in the U.S. and two in Europe. According to Honeywell, fuel produced by the Ecofining process has a cetane value of 80, compared with a cetane range of 40 to 60 found in diesel at the pump today. As a result, it makes an excellent blendstock for cheaper low-cetane diesel to meet transportation standards, and it performs well at cold or warm temperatures.

Diamond Green Diesel - Port Arthur
PROPOSED / 400 MMgy
Port Arthur, Texas

Diamond Green Diesel announced in October that it had received the necessary air permits to move forward with a second renewable diesel plant in Port, Arthur, Texas. For several months, Darling and Valero have been considering developing the 400 MMgy renewable diesel plant near an existing Valero refinery at that location. At press time, a final investment decision on the project was looming.

"Our timeline to construct an additional 400 million gallons of renewable diesel production in Port Arthur, Texas, is on schedule," said Randall Stuewe, chairman and CEO of Darling Ingredients. "DGD is in the process of finalizing Phase III engineering plans and cost estimates to build another state-of-the-art facility. We anticipate that both joint venture partners' board of directors will be in a position to approve moving forward with the project in early 2021. As we meet this investment decision timeframe, we believe that [the plant] would be operational in 2024."

Development of the Port Arthur facility would boost Diamond Green Diesel's annual renewable diesel production capacity to 1.1 billion gallons per year. The two facilities would also be capable of producing a combined 100 MMgy of renewable naphtha.

HollyFrontier Corp. - Artesia
UNDER CONSTRUCTION / 110 MMgy
Artesia, New Mexico

HollyFrontier Corp. announced in early June that its board of directors had approved a plan to construct a pretreatment unit (PTU) at its Artesia, New Mexico, refinery, enabling the facility to produce approximately 110 MMgy of renewable diesel on site, and giving the company a total capacity to produce more than 200 MMgy (see Cheyenne announcement below). The refiner expects to invest \$650 to \$750 million in its renewables business, with an expected aggregate internal rate of return as high as 30 percent.

The PTU, which is being supplied by Alpha Laval, will process more than 80 percent of the feedstock for both of HollyFrontier's renewable diesel plants—Artesia and Cheyenne. The PTU is expected to provide feedstock flexibility, mitigating single feedstock risk and generating value through the use of lower-carbon intensity inputs.

HollyFrontier estimates the capital cost of the PTU to be between \$175 million and \$225 million, with the plant coming on line in 2022.

HollyFrontier Corp. - Cheyenne
UNDER CONSTRUCTION / 90 MMgy
Cheyenne, Wyoming

Along with its New Mexico project, HollyFrontier intends to repurpose its Cheyenne, Wyoming, refinery to produce 90 MMgy of renewable diesel. The company expects the project to be completed in early 2022.

The conversion to renewable diesel production will result in HollyFrontier ceasing petroleum refining altogether at the Cheyenne unit.

"Demand for renewable diesel, as well as other lower-carbon fuels, is growing and taking market share based on both consumer preferences and support from substantial federal and state government incentive programs," said Mike Jennings, president and CEO of HollyFrontier. "This represents an exciting opportunity to enhance both the profitability and environmental footprint of HollyFrontier through organic investment. [These] announcements lay the groundwork for an integrated renewables business at HollyFrontier, including multiple renewable diesel plants with feedstock flexibility."

Grön Fuels LLC
PROPOSED / 900 MMgy
Baton Rouge, Louisiana

In November, Fidelis Infrastructure co-founders Daniel Shapiro and Bengt Jarlsjo said their portfolio company Grön Fuels LLC was studying the feasibility of a renewable fuel complex at the Port of Greater Baton Rouge. With expansions and associated projects, the complex could involve up to \$9.2 billion of total investment over several phases. A final investment decision is expected in 2021, which will determine the cost of the project's first phase.

The project would be built in stages over nine years at a site leased from the port on the west bank of the Mississippi River, near Port Allen. The first phase of construction would involve a capital investment of over \$1.25 billion and create 340 new direct jobs by 2024. The base project is expected to produce more than 900 MMgy of renewable diesel, with an option to produce renewable jet fuel utilizing non-fossil feedstocks, including soybean oil, corn oil and animal fats. When all phases of the project are complete—potentially by 2030—the site would be one of the largest renewable fuel complexes in the world.

"This is a transformative new company and investment for the capital region, and we have enjoyed working on this project with company executives over the last year," said Adam Knapp, president and CEO of the Baton Rouge Area Chamber. "Fidelis brings hundreds of quality, high-paying jobs and huge capital investment during a critical time for both jobs and innovation for this sector. This is a big deal, and puts metro Baton Rouge on the map as home to the largest renewable fuel refinery in the world."

Note: This project was not represented on Biodiesel Magazine's 2021 Biodiesel and Renewable Diesel Plant Map.

Marathon Petroleum - Dickinson
OPERATIONAL / 184 MMgy
Dickinson, North Dakota

In late 2020, Marathon Petroleum said it was in the process of commissioning its renewable diesel facility in Dickinson, North Dakota, while also progressing with plans to convert its

Martinez, California, refinery to renewable diesel (see Martinez listing above, right).

Marathon CEO Mike Hennigan discussed both projects during a Q3 earnings call. He said the Dickinson project was coming online and, once fully operational, would produce approximately 184 MMgy of renewable diesel.

The Dickinson refinery, formerly owned by Tesoro, will utilize pretreated feedstock from a biodiesel plant Marathon purchased last year. As previously reported by *Biodiesel Magazine*, Marathon acquired the 50 MMgy Duonix biodiesel plant in Beatrice, Nebraska, which was idled in 2019 by joint-venture owners Flint Hills Resources and Benefuel. Marathon plans to use the facility to aggregate and pretreat feedstocks such as distillers corn oil, soybean oil and rendered fats before shipping them up to North Dakota as a ready-made renewable diesel input.

The Beatrice plant was originally built in 2008 but was never fully operable. Flint Hills Resources purchased the facility in 2011 and, two years later, the company formed its joint venture with Benefuel, a biodiesel production technology provider. Now under Marathon's ownership as a feedstock pretreatment facility, the Beatrice plant is presumed operational.

Marathon Petroleum - Martinez

PROPOSED / 736 MMgy

Martinez, California

Marathon disclosed late last year that it was seeking permits to convert its Martinez, California, refinery into a renewable diesel plant. The company is reportedly already engaging in discussions with feedstock suppliers and has begun detailed engineering work on the proposed project. If commissioned, the plant would likely begin producing renewable diesel in 2022 and reach full capacity in 2023. At peak capacity, the facility would be capable of producing as much as 736 MMgy, primarily from animal fats, soybean oil and distillers corn oil.

In addition to reducing its RIN liability, Marathon wants to reduce its greenhouse gas emissions intensity by 30% below 2014 levels by 2030. Marathon's conversion of the Martinez facility from a petroleum refinery to a renewable diesel facility is anticipated to reduce the unit's greenhouse gas emissions by 70%.

The Martinez project would join a portfolio of Marathon renewable fuels projects that have been ongoing for years, including the conversion of the Dickinson, North Dakota, refinery to a renewable diesel plant (see below, left); investment in its advanced biofuels subsidiary, Virent; biodiesel production at Marathon's Cincinnati facility; pretreatment in Nebraska; and ethanol production through a Midwest joint venture.

Next Renewable Fuels

PROPOSED / 575 MMgy

Port Westward, Oregon

In and out of the news over the past two years, Next Renewable Fuels is a proposed renewable diesel plant near Clatskanie, Oregon, with a projected \$1 billion price tag. If approved and constructed, the refinery would be capable of producing more than 575 MMgy of advanced biofuels initially, later growing to more than 750 MMgy.

The feedstock-agnostic refinery would utilize white and brown grease, animal tallow, soy oil and a variety of vegetable oils—but expressly not virgin palm oil. Both the feedstock and the outgoing biofuel would be transported to and from the refinery by ship—through the Port of Columbia's Port Westward Industrial Park—minimizing rail traffic.

Last year, the Port of Columbia County Commissioners approved a long-term ground lease with Next Renewable Energy for a 90-acre industrial site. Still in a protracted permitting phase, developers hope to begin commercial operations in early 2022. However, the company's high-profile CEO was terminated in late 2020, putting the current state of the project in question. Representatives of the company, however, told local media that the "project will continue without interruption" and is "moving forward full speed."

About 90% of the plant's output would be renewable diesel. The rest would be renewable propane, which would be recycled back into the refining process.

Note: This project was not represented on Biodiesel Magazine's 2021 Biodiesel and Renewable Diesel Plant Map.

Phillips 66 - Rodeo Renewed

PROPOSED / 680 MMgy

Rodeo, California

In mid-2020, Phillips 66 announced its intention to reconfigure a refinery in Rodeo, California (near San Francisco), to produce a variety of renewable fuels. The plant will no longer produce fuels from crude oil, switching entirely to biobased inputs: used cooking oil, fats, greases and soybean oil.

The RodeoRenewed project, still obtaining permitting, would produce 680 MMgy of renewable fuels, including renewable diesel, renewable gasoline and sustainable jet fuel. Combined with other production assets being developed, Phillips 66 could ultimately produce more than 800 MMgy, making it one of the world's largest renewable diesel producers.

The scope of the Rodeo project includes the construction of pretreatment units and the repurposing of existing hydrocracking units to enable renewable fuels production.

If approved by Contra Costa County officials and the Bay Area Air Quality Management District, the plant could begin production by early 2024. California Gov. Gavin Newsom has expressed support for the project, and others like it, and asked area officials to put “less red tape” in the way.

In early 2020, Phillips 66 and Renewable Energy Group Inc. (see right) discontinued their joint effort to construct a large-scale renewable diesel plant in Ferndale, Washington. Permitting delays and other uncertainties made moving forward with the 250 MMgy project challenging.

REG Geismar LLC
UNDER EXPANSION / 340 MMgy
Geismar, Louisiana

Renewable Energy Group Inc. is preparing to begin expanding its biorefinery in Geismar, Louisiana, from 90 MMgy to 340 MMgy. Construction is expected to begin in mid-2021 with mechanical completion expected in late 2023. The expansion project will require approximately \$825 million in capital investment.

The Geismar facility, originally a joint venture between Tyson Foods and Syntroleum Corp., is considered to be the first renewable diesel plant built in the U.S. The facility came online in 2010 with a capacity of 75 MMgy—later, ramping up to 90 MMgy—and was purchased by REG in 2014. Three years later, REG acquired an additional 82 acres of land near the Geismar plant to support the coming expansion.

In its third quarter financial report, REG CEO Cynthia Warner said, “REG is positioned to lead and capitalize on this unique opportunity with strong ongoing production, and our focused downstream strategy to deliver value to our customers while expanding our margins. We are building upon this momentum with the planned Geismar expansion.”

In mid-2020, REG announced that it had entered into an agreement with California-based Hunt & Sons Inc. to sell REG’s trademarked Ultra Clean fuel—a blend of biodiesel and renewable diesel—at 12 locations in northern California.

Ryze Renewables - Las Vegas
UNDER CONSTRUCTION / 100 MMgy
Las Vegas, Nevada

Last year, *Biodiesel Magazine* reported that Ryze Renewables had two projects under development in Nevada, one near Las Vegas and another in Reno. Since then, the company has exited the Reno project—a 50 MMgy facility—and is focusing exclusively on the development of its 100 MMgy refinery in Las Vegas (at the former site of Biodiesel of Las Vegas).

A statement on the company’s website says: “This capacity is only a fraction of what is needed—the demand for renewable diesel in California alone is expected to exceed 150,000 barrels per day. Ryze plans to maximize the Las Vegas site to expand capacity there as well as seek additional sites to develop to meet this demand over the next 10 years.”

The existing biodiesel processing facility is located on a developed 14-acre property that includes utilities, operation buildings and tanks setup to process fuel products. The facility is in the process of being repurposed with the necessary additional infrastructures and hydro-processing equipment to produce renewable diesel. Engineering, procurement and construction services for the project are being provided by Las Vegas-based MMC Inc.

Note: At press time, Biodiesel Magazine had not determined the current owner of the Reno facility.

World Energy - Paramount
UNDER CONSTRUCTION / 330 MMgy
Paramount, California

World Energy, which owns five biodiesel plants in the U.S. and two in Canada, acquired the renewable fuels facility in Paramount, California (near Los Angeles) in March 2018.

As part of the acquisition, World Energy announced a \$350 million investment to fully convert the refinery to produce 330 MMgy of renewable fuels including sustainable aviation fuel (SAF), renewable diesel, renewable gasoline and propane from inedible agricultural wastes.

The company bought the 50,000 barrel per day refinery for \$72 million from Delek U.S. Holdings, which, included a pipeline network in California. The Paramount refinery includes a 65-acre complex consisting of the refinery, product storage tanks and truck and rail loading and unloading facilities. The current renewable fuels production at the Paramount facility is 3,500 barrels per day. Following the conversion, the Paramount facility will produce 25,000 barrels per day.

The conversion is scheduled for completion in 2023.

Note: This project was represented on Biodiesel Magazine’s 2021 Biodiesel and Renewable Diesel Plant Map as a 300 MMgy facility. The projected capacity has since been reported as 330 MMgy.

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